

SKIRTED CLOSURE FOR SMALL DROPPER BOTTLES

The present invention generally relates to closure devices and more particularly relates to an injected molded  
5 closure for a dropper bottle which provides for simultaneous sealing of a nozzle outlet and protection of internal formations for enabling engagement and disengagement of the closure with a bottle.

10 A great number of injection molded caps have been developed over the years for the sealing of dispensing vials and bottles during non-use thereof.

Generally two types of bottle caps have been developed,  
15 namely push-on-caps and thread-on-caps. Push-on-caps are installed by aligning the cap with the opening of the bottle and simply applying an axial force to the top of the cap.

As is evident, a thread-on-cap generally requires that  
20 the cap and bottle be aligned and a rotational force applied to the cap, or bottle, in order to produce a sealing engagement.

Heretofore, however, such sealing engagements have been  
25 directed principally to a nozzle outlet for preventing ejection of liquid from the bottle when not in use. This seal is typically effective for squeezable droppers or bottles, which may be inadvertently squeezed. That is, the seal for the nozzle outlet of such dropper bottles must be sealed with

sufficient pressure to prevent the passage of fluid or liquid upon pressure being applied to the bottle.

5        However, none of these devices have addressed the contamination problem with regard to the threaded engagement between the cap and the bottle or nozzle shoulder. That is, contaminants may enter the nozzle and nozzle aperture area by contamination of the threads and migrate therepast by a operation of the screw threads during removal and replacement  
10 of the cap or closure on the bottle nozzle. In addition, fluid that may be exerted past the nozzle aperture seal will pass into the environment with prior art devices.

15        The present invention overcomes the shortcomings of the prior art and provides for a dropper bottle closure which not only seals the nozzle aperture, but also seals the threaded engagement of the closure with the nozzle from the environment.

## 20        SUMMARY OF THE INVENTION

25        A closure for a dropper bottle in accordance with the present invention generally includes a nozzle disposed on a bottle and having a neck and a shoulder with the neck having an aperture at one end thereof for dropwise disbursement of a liquid and the shoulder having an internal formation for engaging a corresponding formation on an external portion of the neck. Preferably, these formations are in the form of threads and grooves.

More specifically, the nozzle includes a shoulder having an outstanding circumferential ring and threads disposed between the ring and the neck.

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A cap is provided which includes a top and an axially downwardly extending skirt. The top includes a seat for sealably engaging an aperture at one end of the nozzle neck and the skirt includes internal grooves for engaging the  
10 nozzle threads along with an internal circumferential lip for sealably engaging the shoulder ring. This seal arrangement protects the threads from environmental contamination. The shoulder ring is spaced apart from the seat for enabling simultaneous sealing of the aperture and the ring upon  
15 rotation of the cap onto the nozzle.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The advantages and features of the present invention will  
20 be better understood by the following description when considered in conjunction with the accompanying drawings in which:

Figure 1 is a perspective view of a closure in accordance  
25 with the present invention for a dropper bottle generally showing a nozzle disposed on a bottle having a neck and a shoulder along with a cap having a top and an axially downwardly extending skirt;

Figure 2 is a cross sectional view of the closure in accordance with the present invention showing the cap disposed on the nozzle before rotation thereof; and

5        Figure 3 is a cross sectional view of the present invention showing simultaneous sealing of an aperture in the nozzle neck and base circumferential ring seal arrangement for protecting threads in the screws in the nozzle and cap skirt respectively.

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#### DETAILED DESCRIPTION

With reference to Figures 1-3, there is shown a closure 10 in accordance with the present invention which generally includes a nozzle 12 disposed on a bottle 14 and having a neck 18 and a shoulder 20. The nozzle 12 may be inserted into the bottle 14 or otherwise formed therein.

The closure 10 may be formed from any suitable injection multiple polymer preferably polypropylene. The closure 10 is most suitable for small bottles having a capacity of less than about 8 ml which necessitates small closure 10. Such small closures makes removal of the cap difficult especially where the primary user may be elderly or with limited hand mobility. 25 This is further a concern for dropper bottles where the elderly are the primary users.

As hereinafter described in greater detail, the shoulder 20 includes a circumferential ring 24 and threads 26 disposed between the ring 24 and the neck 18.

5       The closure 10 further includes a cap 30 having a top 32 and an axially downwardly extending skirt 34.

10       The skirt 34 enhances the physical size of the cap 30 and thus facilitates its use by elderly or infirmed individuals as hereinabove noted which may heretofore have had difficulty in handling prior art caps, not shown, for small prior art bottles, also not shown.

15       As shown in Figures 2 and 3, the top 32 includes a seat 36 for sealably engaging an aperture 38 in the neck 18 as illustrated in Figure 3. The skirt 34 includes internal grooves 40 for engaging the threads 26 and an internal circumferential lip 44 for engaging the ring 24.

20       Importantly, the lip 44 is spaced apart from the aperture 38 for enabling simultaneous sealing of the aperture 38 and the ring 24 upon rotation of the cap 30 onto the nozzle 12.

25       Although there has been hereinabove described a specific skirted closure for small dropper bottles in accordance with the present invention for the purpose of illustrating the manner in which the invention may be used to advantage, it should be appreciated that the invention is not limited thereto. That is, the present invention may suitably

comprise, consist of, or consist essentially of the recited elements. Further, the invention illustratively disclosed herein suitably may be practiced in the absence of any element which is not specifically disclosed herein. Accordingly, any  
5 and all modifications, variations or equivalent arrangements which may occur to those skilled in the art, should be considered to be within the scope of the present invention as defined in the appended claims.